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A ECO-FRIENDLY ENZYMATIC APPROACH FOR THE PRODUCTION OF 2,5-BIS-(HYDROXYMETHYL)FURAN FATTY ACID ESTERS

ORAL PRESENTATION

Mihai Lăcătuș[1], Monica Ioana Toșa[1], Csaba Paizs[1], Florin-Dan Irimie*[1]

[1]*Biocatalysis and Biotransformation Research Group, Babeș-Bolyai University, Faculty of Chemistry and Chemical Engineering, Arany János 11, Cluj-Napoca Ro-400028, Romania, *irimie@chem.ubbcluj.ro*

1. Importance

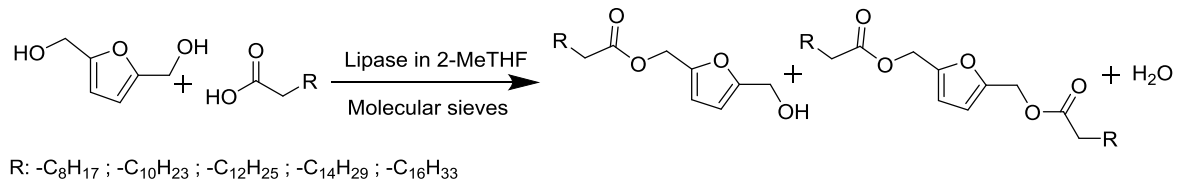
Biomass-based platform chemicals have attracted a lot of attention from the research community in the last years, due to the necessity of greener and renewable alternatives to fossil-based industrial chemicals and products. One of these green alternatives is 2,5-bis-(hydroxymethyl)furan (BHMF), a derivative of 5-hydroxymethylfurfural. The high carbon content of the obtained fatty acid mono- and diester products make them suitable candidates as additives for biodiesel fuels. Moreover, their use as bio-derived plasticizers within materials replacing the problematic “phthalates” has been recently reported.

2. Conclusion

A green and efficient method for the esterification of BHMF with saturated long-chain fatty acids has been successfully established. Use of a commercially available lipase and biomass-derived 2-MeTHF as solvent has a promising environmental footprint while offering excellent results in terms of conversion and reusability of the biocatalyst.

3. Description

The enzymes screening proved that the commercially available immobilized *Candida antarctica* lipase B (Novozyme 435) is the best biocatalyst for the enzymatic esterification (Figure 1). The reactions proceeded with high conversion in many organic solvents, with a complete conversion in the eco-friendly biomass-derived 2-methyl-tetrahydrofuran. Upon optimization of the reaction parameters, it was observed that although increasing the reaction temperature resulted in higher conversions, the main factor influencing the outcome of the reaction was the quantity of molecular sieve added to the reaction media, which shifted the equilibrium towards preferential formation of the fatty acids diesters.



R: $-C_8H_{17}$; $-C_{10}H_{23}$; $-C_{12}H_{25}$; $-C_{14}H_{29}$; $-C_{16}H_{33}$

Figure 1: Enzymatic esterification of BHMF with long-chain fatty acids

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